

REMARKS

Examiner Farahani is thanked for his thorough search and Office Action. Reconsideration of the rejection of all claims is respectfully requested. We wish to comment on his remarks as follows:

Introduction

The present invention discloses a bipolar transistor structure whose base region is made up of two sub regions, the region closest to the emitter having a resistivity about an order a magnitude lower than the second region (which interfaces with the collector). A key feature of the invention is that the region closest to the collector is very uniformly doped, i.e. there is no gradient or built-in field present.

Reconsideration is requested of all rejections based on 35 U.S.C. 103:

Examiner has based his rejection on Morishita in view of Frisina. Morishita is cited as teaching an N⁺ buried collector. The collector structure of the present invention is N/N⁺ whereas that of Frisina, as well as Morishita, is N⁻/N⁺, making their structures different from the present invention in this respect alone.

However, the novelty of the present invention lies, not so much in its collector structure, as in its base structure (P around P+). As Examiner has pointed out, Frisina also teaches a (P around P+) structure. Nevertheless, Frisina's base structure differs significantly from that of the present invention because Frisina's base (both primary and secondary parts) is made to have a substantial dopant concentration gradient (col. 3 lines 37-45) whereas the secondary base of the present invention is specified (claim 12 lines 5-6) to comprise "... P type silicon, throughout which boron ions are uniformly distributed...".

Examiner also argues that it would be obvious to substitute boron (present invention) for aluminum (Frisina) since both are acceptor ions. Oftentimes this would be true but not in the present situation. Frisina explicitly favors aluminum over boron because it diffuses about 10x faster in silicon than boron. This is important for making Frisina's structure where a deep diffusion is used (resulting in Frisina's steep dopant concentration gradient). The present invention aims to achieve just the opposite result by forming the secondary base region through epitaxial growth, boron being added at the same time. Since it is important that the dopant not diffuse far from its initial location in the secondary base layer, a slow diffuser is essential. In other words, the structure of the present invention could not have been made with aluminum as the dopant and Frisina's structure could not have been made with boron as the dopant.

TSMC98-083B

For the record, we are not claiming a 'structure by process' invention here. As Examiner certainly knows, a graded base transistor behaves quite differently from one having a uniformly doped base, not because of how it was made but because of the internal distribution of dopant ions in its base region.

In conclusion, we again thank Examiner Farahani for his careful reading of our application.

Reconsideration and withdrawal of the rejection is respectfully requested.

Allowance of all Claims is requested. It is also requested that should Examiner Farahani not find that the Claims are now Allowable, he should please call the undersigned Attorney at (845)-452-5863 to overcome any problems preventing Allowance.

Respectfully submitted

A handwritten signature in black ink, appearing to be 'SBA', followed by a long horizontal line extending to the right.

Stephen B. Ackerman #37761

BEST AVAILABLE COPY